

Claims

1. Silicon feedstock for producing directionally solidified Czochralski, float zone or multicrystalline silicon ingots, thin sheets and ribbons for the production of silicon wafers for PV solar cells, characterized in that the silicon feedstock contains between 0.2 and 10 ppma boron and between 0.1 and 10 ppma phosphorus distributed in the material.
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2. Silicon feedstock according to claim 1, characterized in that the silicon feedstock contains between 0.3 and 5.0 ppma boron and between 0.5 and 3.5 ppma phosphorus.
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3. Silicon feedstock according to claim 1 or 2, characterized in that the silicon feedstock comprises less than 150 ppma of metallic elements.
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4. Silicon feedstock according to claim 3, characterized in that the silicon feedstock comprises less than 50 ppma of metallic elements
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5. Silicon feedstock according to claims 1 - 3, characterized in that the silicon feedstock contains less than 150 ppma carbon.
6. Silicon feedstock according to claims 1 - 3, characterized in that the silicon feedstock contains less than 100 ppma carbon.
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7. Directionally solidified Czochralski, float zone or multicrystalline silicon ingot or thin silicon sheet or ribbon for making wafers for solar cells, characterized in that the silicon ingot, thin sheet or ribbon contains between 0.2 ppma and 10 ppma boron and between 0.1 ppma and 10 ppma phosphorus distributed in the ingot, said silicon ingot having a type change from p- type to n-type or from n-type to p-type at a position between 40 and 99 % of the ingot height or sheet or ribbon thickness and having a resistivity profile described by a curve having a starting value between 0.4 and 10 ohm cm and where the resistivity value increases towards the type change point.
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8. Directional solidified silicon ingot, thin sheet or ribbon according to claim 7, characterized in that resistivity starting value is between 0.7 and 3 ohm cm.
- 5 9. Method for the production of silicon feedstock for producing directionally solidified Czochralski, float zone or multicrystalline silicon ingots, thin silicon sheets or ribbons for the production of silicon wafers for PV solar cells, characterized in that metallurgical grade silicon produced in an electric arc furnace by carbothermic reduction 10 furnace and containing up to 300 ppma boron and up to 100 ppma phosphorus is subjected to the following refining steps:
- 15 a) treatment of the metallurgical grade silicon with a calcium-silicate slag to reduce the boron content of the silicon to between 0.2 and 10 ppma;
- 20 b) solidifying the slag treated silicon from the step a);
- c) leaching the silicon from step b) in at least one leaching step by an acid leach solution to remove impurities;
- d) melting the silicon from step c);
- 25 e) solidifying the molten silicon from step d) in the form of an ingot by directional solidification;
- f) removing the upper part of the solidified ingot from step e) to provide a silicon ingot containing 0.2 to 10 ppma boron and 0.1 to 10 ppma phosphorus;
- g) crushing and/or sizing the silicon from step f).

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